# PAPER TRAY UNIT
# (Machine Code: D331)

# SERVICE MANUAL

March, 2007
Subject to change

# Safety and Symbols

## Replacement Procedure Safety

### ⚠CAUTION

- Turn off the main power switch and unplug the machine before beginning any of the replacement procedures in this manual.

## Symbols Used in this Manual

This manual uses the following symbols.

☛: See or Refer to

: Screws

: Connector

: Clip ring

: E-ring

# TABLE OF CONTENTS

# 1. Replacement and Adjustment

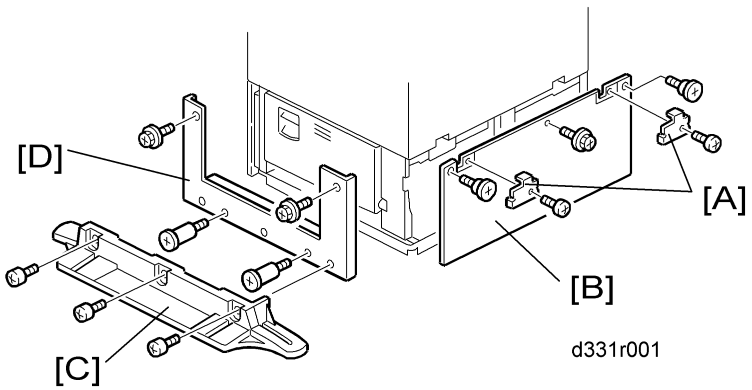


## Covers and Roller

### ⚠CAUTION

- Turn off the main power switch and unplug the machine before beginning any of the procedures in this section.

### Covers




#### Rear Cover

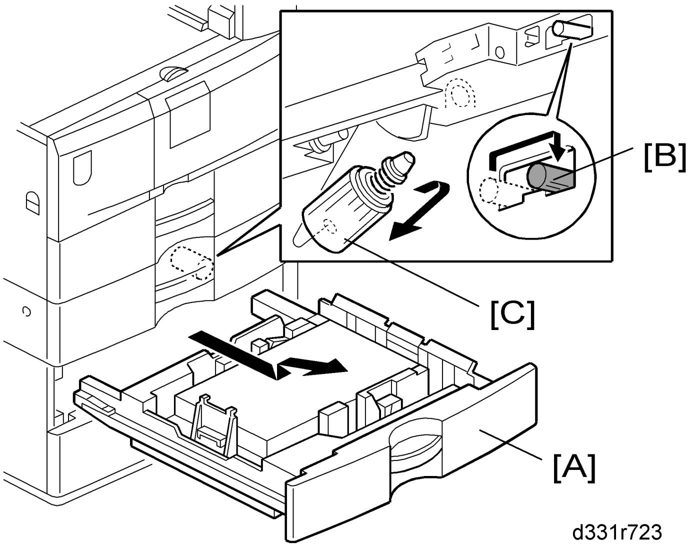
1. Hold brackets [A] (screw x 1 each)
2. Rear cover [B] (screw x 3)

#### Right Cover

1. Right side stopper [C] (screw x 3)
2. Right cover [D] (screw x , knob screw x 2)

1

## Feed Roller



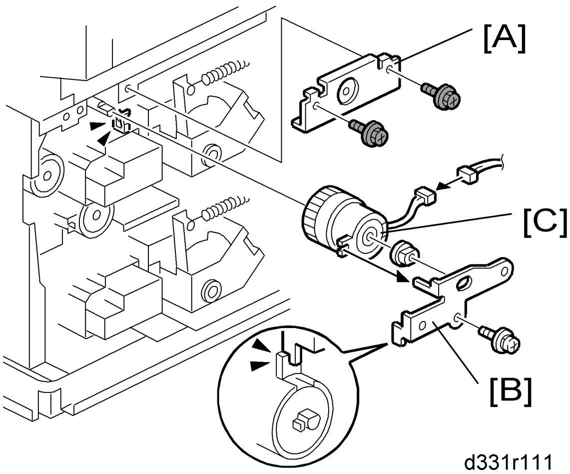

1. Pull out the tray [A].
2. Release the lock lever [B].
3. Feed roller [C]

# Drive Components

## ⚠CAUTION

- Turn off the main power switch and unplug the machine before beginning any of the procedures in this section.

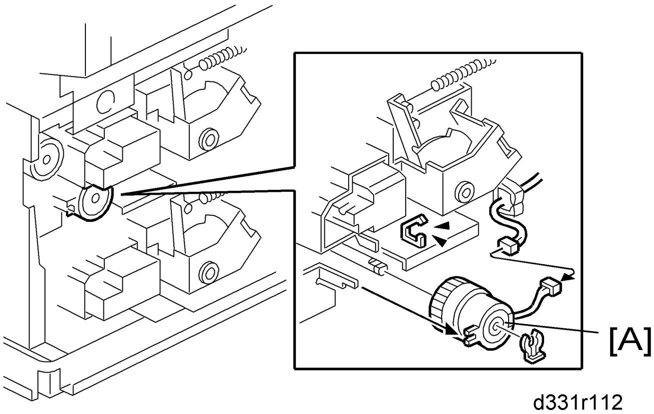
## Upper Feed Clutch




1. Rear cover (☛ "Covers")
2. Bracket [A] (🔩 x 2)
3. Hold bracket [B] (🔩 x 1, bushing x 1)
4. Upper feed clutch [C] (connector x 1)

1

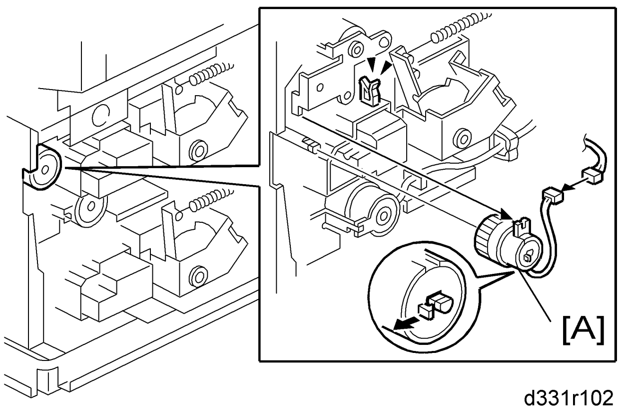
## Lower Feed Clutch




d331r112

1. Rear cover (☛ "Covers")
2. Lower feed clutch [A] ( x 1,  x 1,  x 1)

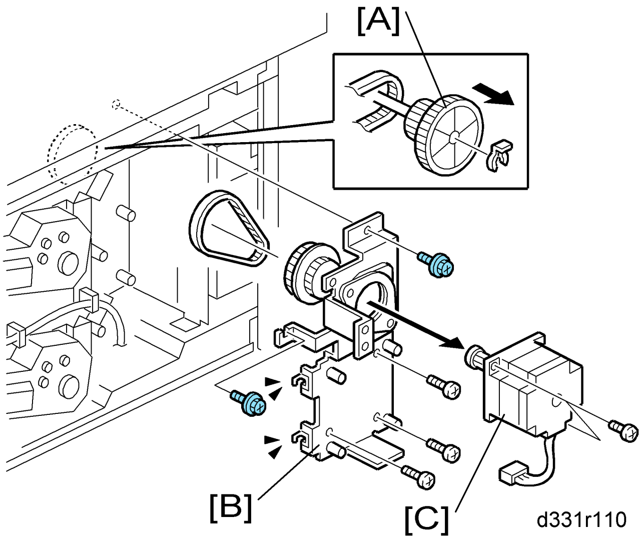
## Relay Clutch




d331r102

1. Rear cover (☛ "Covers")
2. Relay clutch [A] ( x 1,  x 1)

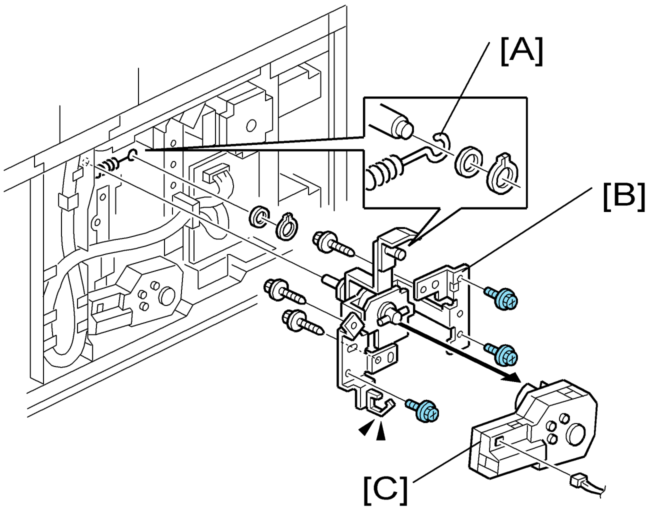
## Paper Feed Motor




1. Rear cover (☛ "Covers")
2. Tray main board (☛ "Tray Main Board")
3. Gear [A] (clip x 1)
4. Paper feed motor bracket [B] (screw x 5)
5. Paper feed motor [C] (screw x 2)

# Lift Motors

## Upper Lift Motor




d331r104

1. Rear cover (☛ "Covers")
2. Spring [A] (snap ring x 1, spacer x 1)
3. Lift motor bracket [B] ( x 3,  x 1)
4. Upper lift motor [C] ( x 3)

## Lower Lift Motor

1. Rear cover (☛ "Covers")
2. Spring (snap ring x 1, spacer x 1)
3. Lift motor bracket ( x 4,  x 1)
4. Lower lift motor ( x 3)

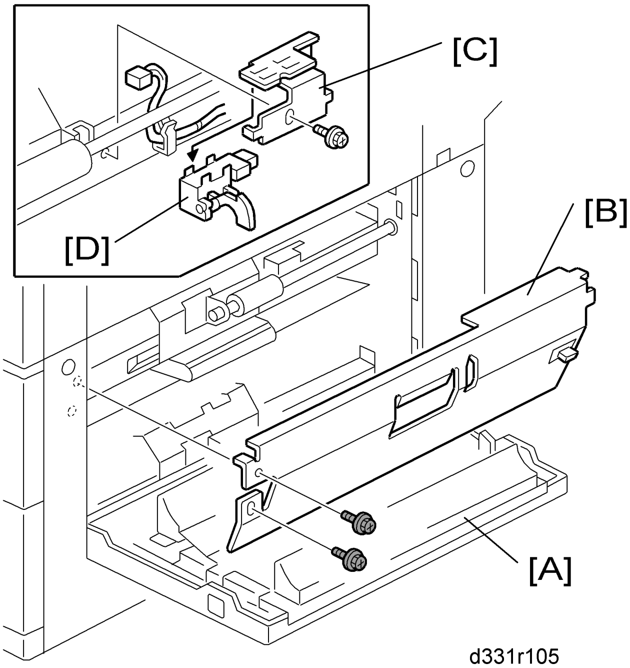
# Electrical Components

## ⚠CAUTION

- Turn off the main power switch and unplug the machine before beginning any of the procedures in this section.

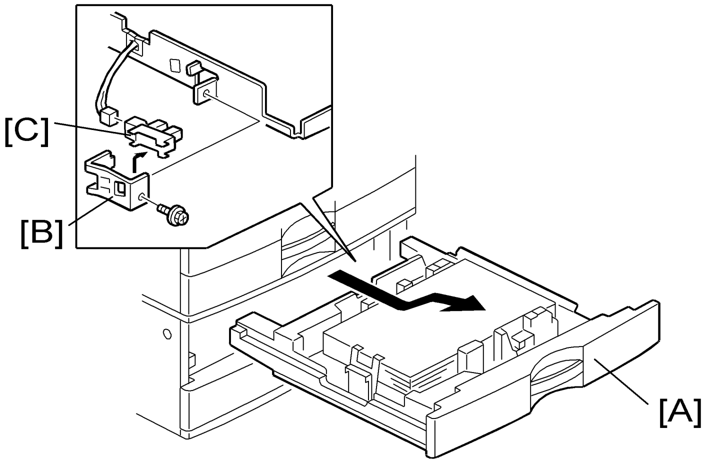


## Vertical Transport Sensor




1. Open the tray cover [A]
2. Guide plate [B] (🔩 x 2)
3. Sensor bracket [C] (🔩 x 1, 🔌 x 1)
4. Vertical transport sensor [D] (hooks)

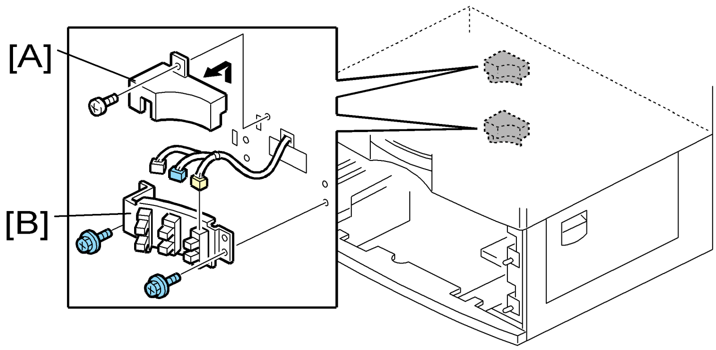
## Paper End Sensor




d331r106

1. Pull out the tray [A]
2. Sensor bracket [B] ( x 1,  x 1)
3. Paper end sensor [C] (hooks)

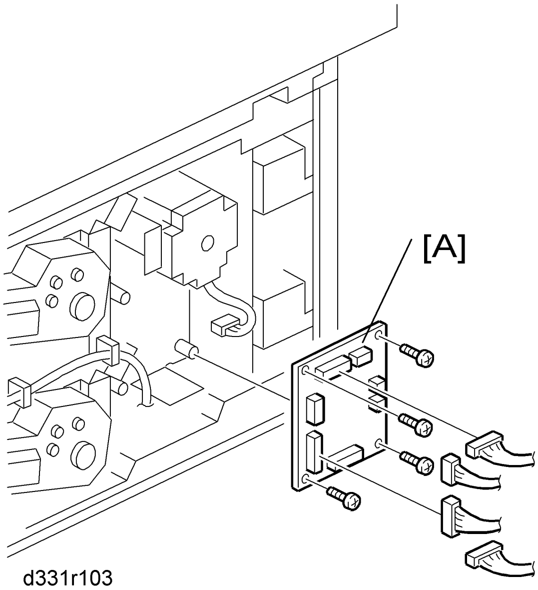
## Paper Size Sensors




d331r108

1. Pull out the two trays.
2. Sensor bracket cover [A] ( x 1)
3. Sensor bracket [B] ( x 3,  x 2)
4. Paper size sensors (hooks)

## Tray Main Board



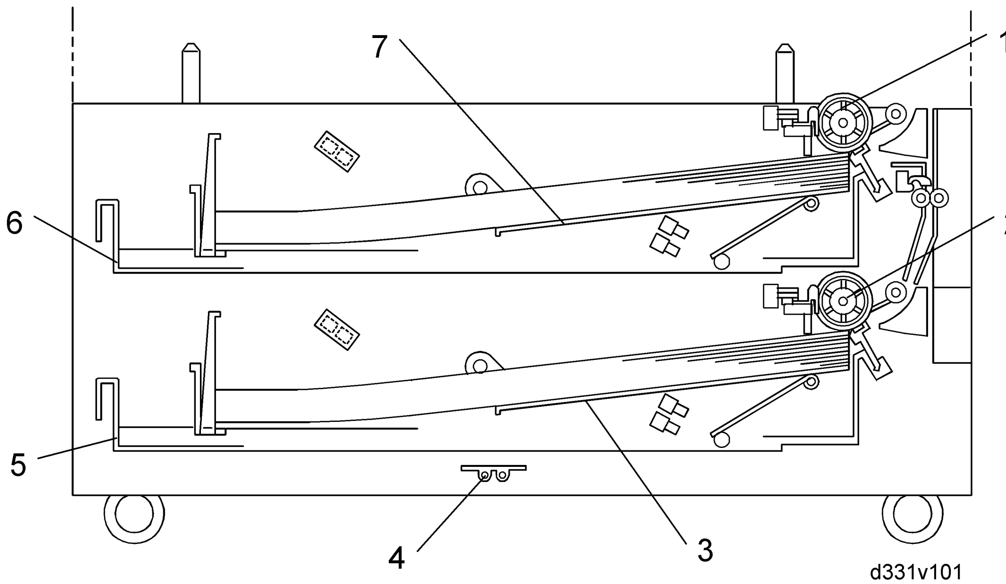

1. Rear cover (☛ "Covers")
2. Tray main board [A] (screw x 4, all connector's)

# 2. Detailed Section Descriptions

## Component Layout

### Mechanical Component Layout

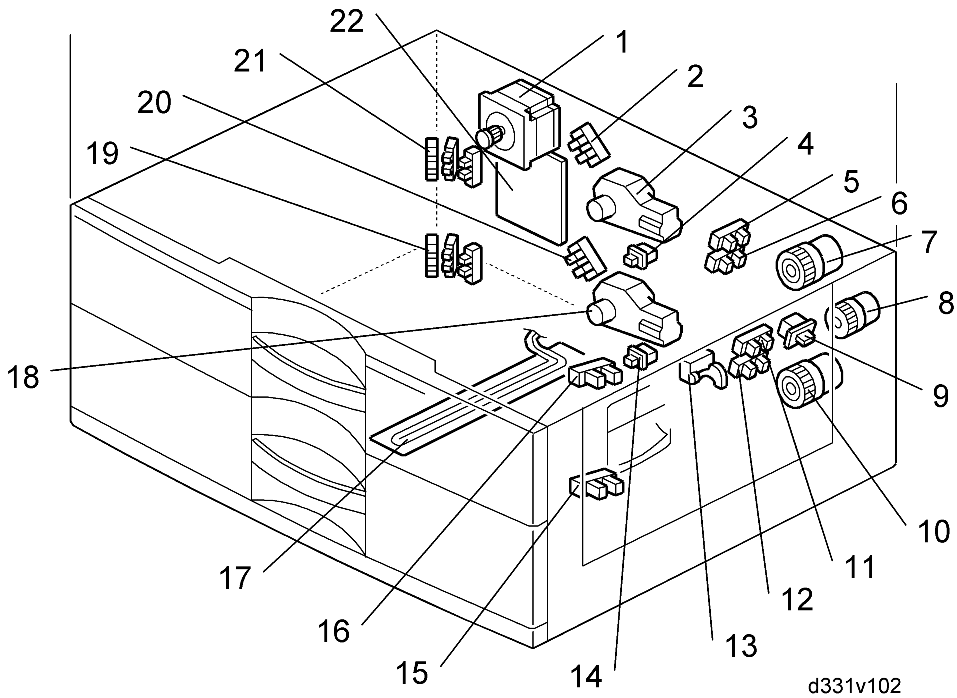





| | |
|---|---|
| 1. Upper paper feed roller<br>2. Lower paper feed roller<br>3. Lower bottom plate<br>4. Optional tray heater | 5. Lower tray<br>6. Upper tray<br>7. Upper bottom plate |

2

## Electrical Component Layout



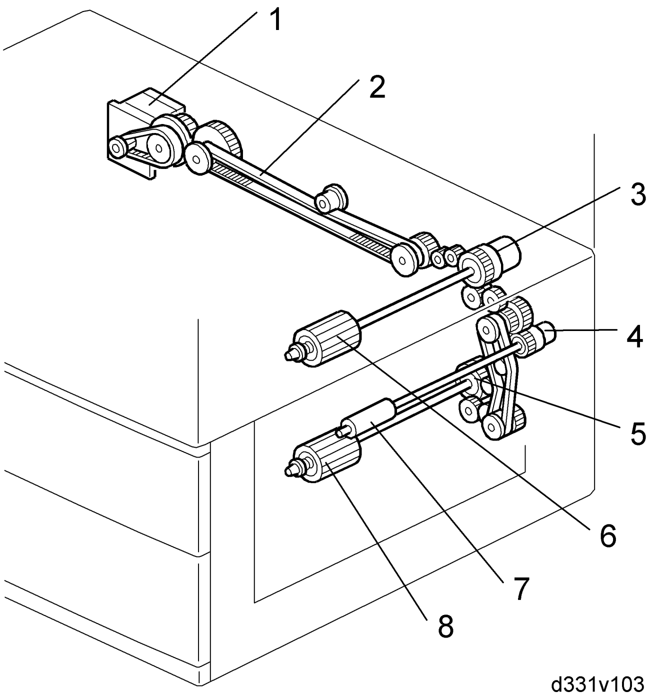

| | |
|---|---|
| 1. Paper feed motor | 12. Lower paper height 1 sensor |
| 2. Upper lift sensor | 13. Vertical transport sensor |
| 3. Upper lift motor | 14. Lower tray set switch |
| 4. Upper tray set switch | 15. Lower paper end sensor |
| 5. Upper paper height 2 sensor | 16. Upper paper end sensor |
| 6. Upper paper height 1 sensor | 17. Optional tray heater |
| 7. Upper paper feed clutch | 18. Lower lift motor |
| 8. Relay clutch | 19. Lower paper size sensors |
| 9. Tray cover switch | 20. Lower lift sensor |
| 10. Lower paper feed clutch | 21. Upper paper size sensors |
| 11. Lower paper height 2 sensor | 22. Tray main board |

## Electrical Component Description

| Symbol | Name | Function | Index No. |
|---|---|---|---|
| Motors | | | |
| M1 | Paper Feed | Drives all rollers. | 1 |
| M2 | Upper Lift | Lifts the upper tray bottom plate. | 3 |
| M3 | Lower Lift | Lifts the lower tray bottom plate. | 18 |
| | | | |
| Sensors | | | |
| S1 | Upper Lift | Detects when the paper in the upper tray is at the correct feed height. | 2 |
| S2 | Lower Lift | Detects when the paper in the lower tray is at the correct feed height. | 20 |
| S3 | Upper Paper End | Informs the copier/printer when the upper tray runs out of paper. | 16 |
| S4 | Lower Paper End | Informs the copier/printer when the lower tray runs out of paper. | 15 |
| S5 | Vertical Transport | Detects misfeeds. | 13 |
| S6 | Upper Paper Height 1 | Detects the amount of paper in the upper tray. | 6 |
| S7 | Upper Paper Height 2 | Detects the amount of paper in the upper tray. | 5 |
| S8 | Lower Paper Height 1 | Detects the amount of paper in the lower tray. | 12 |
| S9 | Lower Paper Height 2 | Detects the amount of paper in the lower tray. | 11 |
| S10 | Upper Paper Size | Determines what paper size is in the upper tray. | 21 |
| S11 | Lower Paper Size | Determines what paper size is in the lower tray. | 19 |
| | | | |
| Switches | | | |
| SW1 | Tray Cover | Detects whether the tray cover is opened or not. | 9 |

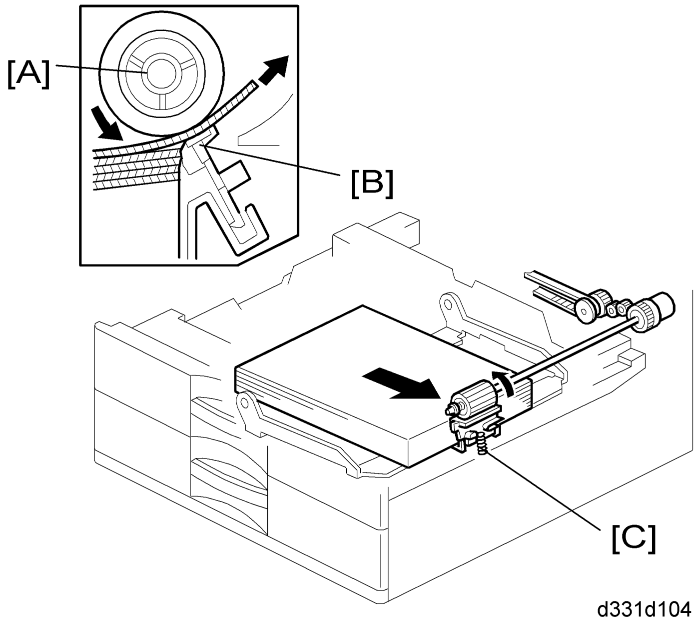
| | | | |
|---|---|---|---|
| SW2 | Upper Tray Set | Detects whether the upper tray is opened or not. | 4 |
| SW3 | Lower Tray Set | Detects whether the lower tray is opened or not. | 14 |
| | | | |
| Magnetic Clutches | | | |
| MC1 | Upper Paper Feed | Starts paper feed from the upper tray. | 7 |
| MC2 | Lower Paper Feed | Starts paper feed from the lower tray. | 10 |
| MC3 | Relay | Drives the relay rollers. | 8 |
| | | | |
| PCBs | | | |
| PCB1 | Tray Main | Controls the paper tray unit and communicates with the copier/printer. | 22 |
| | | | |
| Others | | | |
| H1 | Optional Tray Heater | Removes humidity from the paper in the trays. | 17 |
| | | | |

## Drive Layout



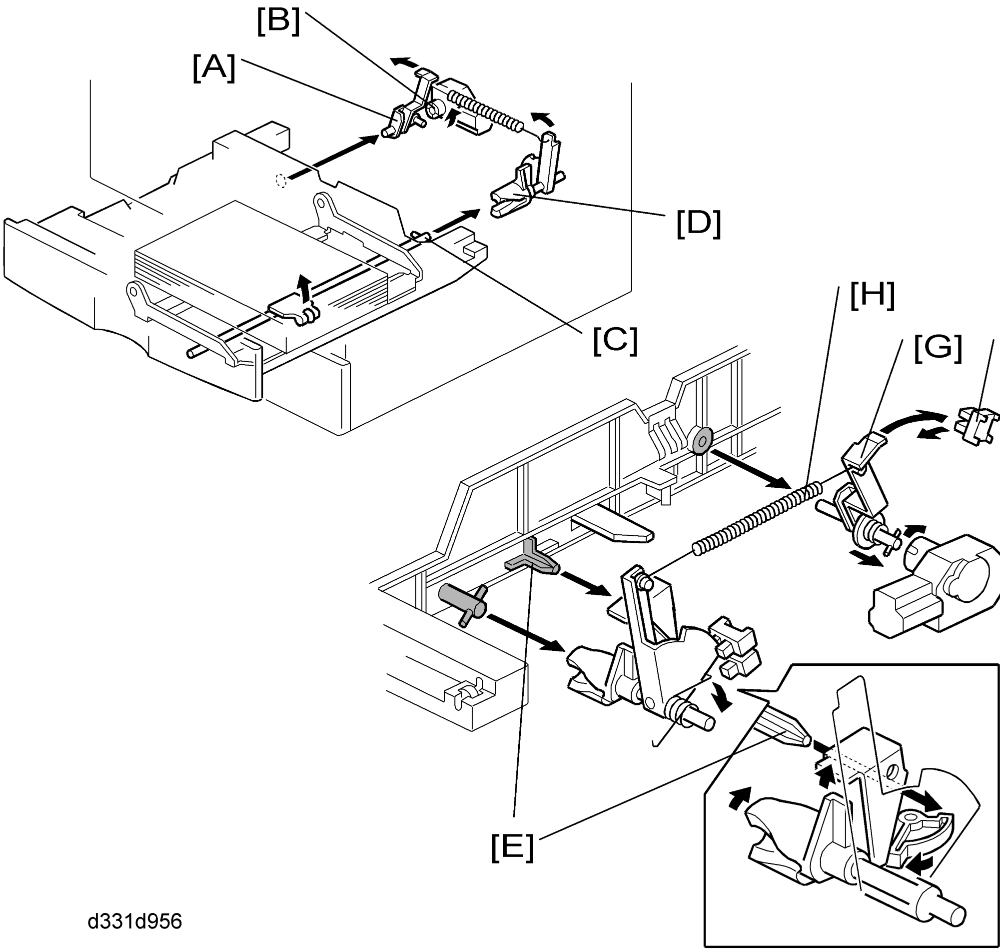

| | |
|---|---|
| 1. Paper feed motor | 5. Lower paper feed clutch |
| 2. Drive belt | 6. Upper paper feed roller |
| 3. Upper paper feed clutch | 7. Relay roller |
| 4. Relay clutch | 8. Lower paper feed roller |

# Paper Feed and Separation Mechanism




The paper tray holds 500 sheets. The paper feed roller [A] drives the top sheet of paper from the paper tray to the copier/printer. The friction pad [B] allows only one sheet to feed at a time. The friction pad applies pressure to the feed roller with a spring [C].

# Paper Lift Mechanism




The paper size switch detects when the tray is pushed in.

When the paper tray is pushed into the machine, the pin [A] for the lift motor pressure shaft engages the lift motor coupling [B] and the pin [C] for the bottom plate lift shaft in the tray engages the bottom plate pressure lever coupling [D]. The pin [E] on the rear of the tray pushes the lock lever so that the lift motor can lift the bottom plate pressure lever.

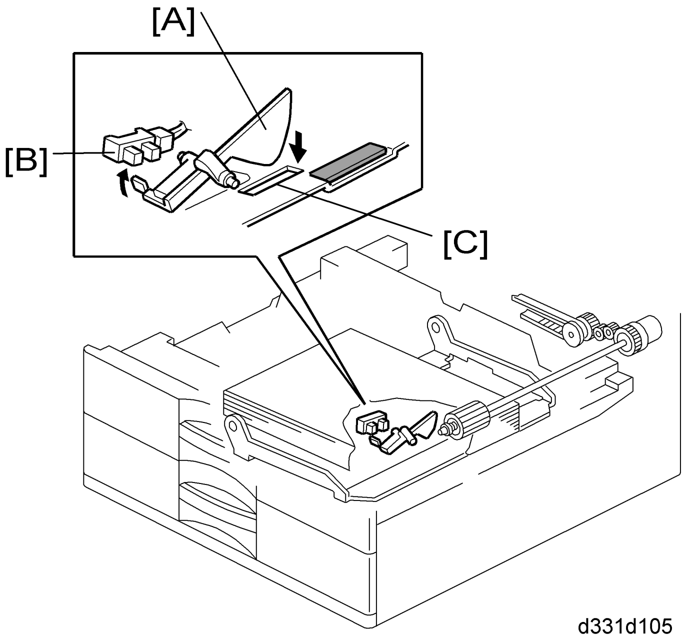
The lift motor turns on, and turns clockwise as viewed on the diagram. The main pressure spring [H] pulls the bottom plate pressure lever, and this lifts the tray bottom plate.

When the top of the stack touches the feed roller, the motor cannot pull up the plate any more, so it pulls the actuator [G] into the lift sensor [F].

The pressure of the feed roller on the paper is now too high, so the lift motor reverses to reduce this pressure. It reverses for 300 ms or 600 ms, depending on the paper size. For smaller paper, it reverses the larger amount (600 ms) to reduce the pressure more.

When the paper tray is pulled out, the pins [A, C] disengage from the couplings [B, D], and the bottom plate drops. To make it easier to push the tray in, the lift motor rotates backwards 1.7 seconds to return the bottom plate pressure lever coupling [D] to the original position.

# Paper End Detection



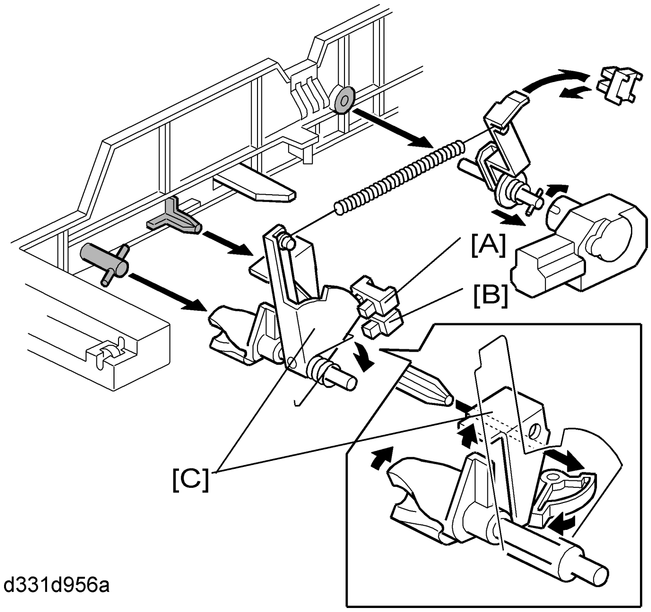

If there is some paper in the paper tray, the paper stack raises the paper end feeler [A] and the paper end sensor [B] is deactivated.

When the paper tray runs out of paper, the paper end feeler drops into the cutout [C] in the tray bottom plate and the paper end sensor is activated.

When the paper tray is drawn out with no paper in the tray, the shape of the paper end feeler causes it to lift up.

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# Paper Height Detection




The amount of paper in the tray is detected by the combination of on/off signals from two paper height sensors [A] and [B].

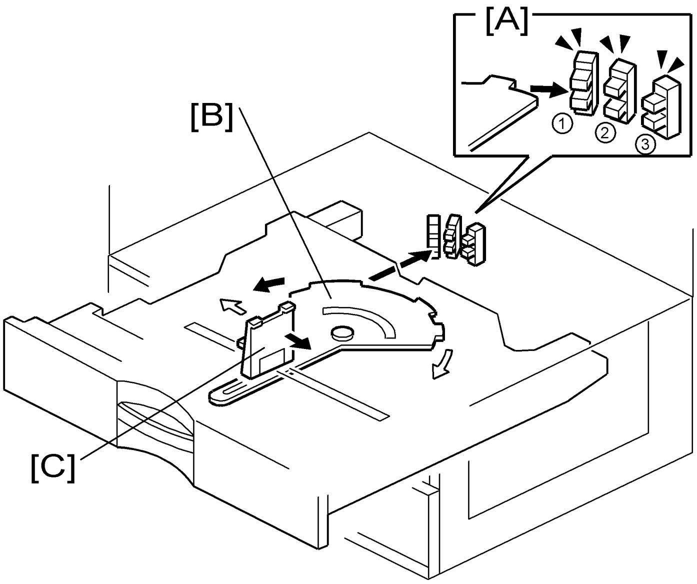
When the amount of paper decreases, the bottom plate pressure lever [C] moves the actuator up.

The following combination of sensor signals is sent to the copier/printer.

| Amount of Paper | Paper Height Sensor 1 | Paper Height Sensor 2 |
|---|---|---|
| Near End | OFF | ON |
| 30% | ON | ON |
| 70% | ON | OFF |
| 100% | OFF | OFF |

When the tray contains paper of a small width, the paper feed pressure may become too low when the thickness of the remaining stack of paper has decreased. The lift motor rotates forward 300 ms after the sensor detects a certain amount of paper remaining in the tray to increase paper feed pressure, simulating the pressure generated by a full tray.

# Paper Size Detection



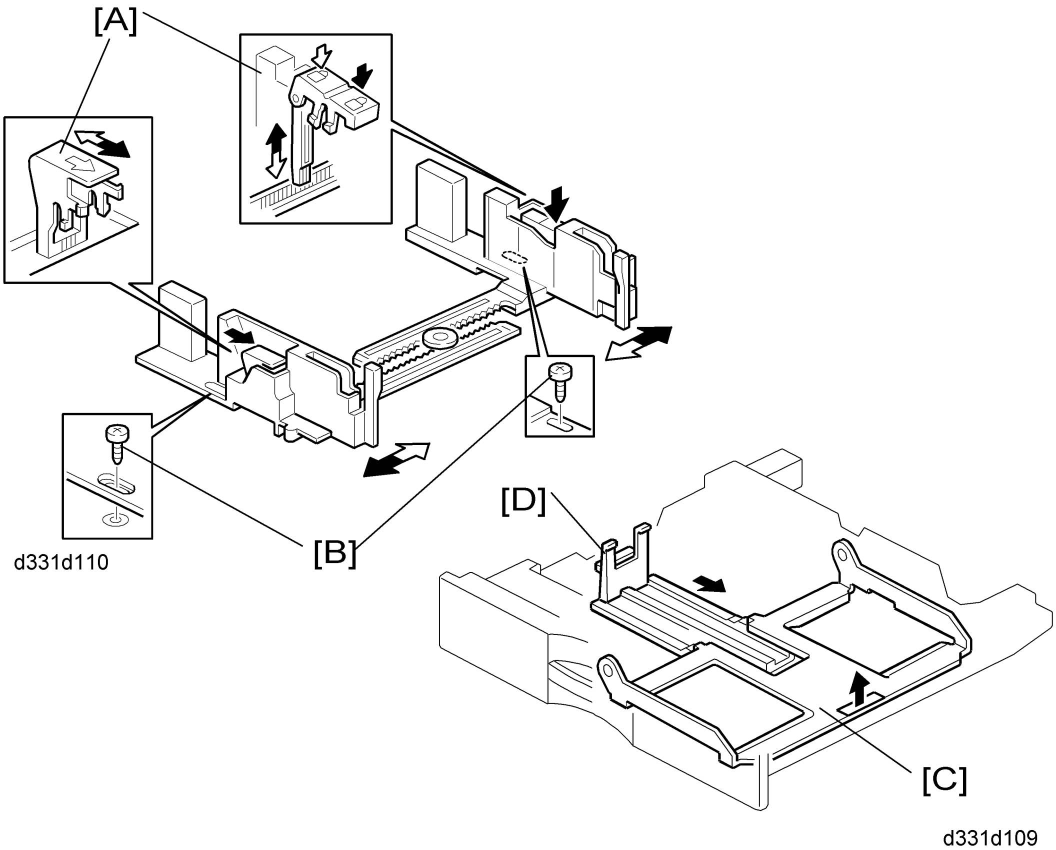

There are three paper size sensors [A] (SN1, SN2 and SN3) on the paper tray unit. Each paper tray has its own actuator [B], with a unique combination of notches. This actuator is moved when the paper end fence [C] is adjusted for the installed paper. To determine which size has been installed, the CPU reads which paper size sensors the actuator has switched off. Refer to the size detection lists as shown below.

| EU/ AISA Size | | SN1 | SN2 | SN3 | SP Setting |
|---|---|---|---|---|---|
| A6 SEF | 148 x 105 | OFF | ON | OFF | A5 LEF |
| B5 LEF | 182 x 257 | ON | OFF | ON | B6 SEF/ Exe LEF |
| A4 LEF | 210 x 297 | ON | ON | OFF | LT LEF/ A5 SEF/ HLT SEF |
| B5 SEF | 257 x 182 | OFF | OFF | ON | |
| LT SEF | 279 x 216 | OFF | OFF | OFF | |
| A4 SEF | 297 x 210 | ON | OFF | OFF | LG SEF |
| B4 SEF | 364 x 257 | ON | ON | ON | |
| A3 SEF | 420 x 297 | OFF | ON | ON | DLT SEF |
| NA Size | | SN1 | SN2 | SN3 | SP Setting |

| | | | | | |
|---|---|---|---|---|---|
| A6 SEF | 148 x 105 | OFF | ON | OFF | A5 LEF |
| B5 LEF | 182 x 257 | ON | OFF | ON | Exe LEF/ B6 SEF |
| LT LEF | 210 x 297 | ON | ON | OFF | A4 LEF/ A5 SEF/ HLT SEF |
| B5 SEF | 257 x 182 | OFF | OFF | ON | |
| LT SEF | 279 x 216 | OFF | OFF | OFF | |
| A4 SEF | 297 x 210 | ON | OFF | OFF | |
| LG SEF | 364 x 257 | ON | ON | ON | |
| DLT SEF | 420 x 297 | OFF | ON | ON | A3 SEF |

The CPU disables paper feed from a tray if the paper size cannot be detected. If the paper size actuator is broken, or if there is no tray installed, the Add Paper indicator will light.

# Side and End Fences




## Side Fences

If the tray is full of paper and it is pushed in strongly, the fences may deform or bend. This may cause the paper to skew or the side-to-side registration to be incorrect. To correct this, each side fence has a stopper [A] attached to it. Each side fence can be secured with a screw [B], for customers who do not want to change the paper size.

## End Fence

As the amount of paper in the tray decreases, the bottom plate [C] lifts up gradually. The end fence [D] is connected to the bottom plate. When the tray bottom plate rises, the end fence moves forward and pushes the back of the paper stack to keep it squared up.

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